

Applicants : Paul V. Werme *et al.*
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Amendments to the Claims:

The following listing of claims will replace all prior versions, and listings, of claims in the application:

1-15. (Cancelled)

16. (Previously Presented) In a distributed environment comprised of N hosts operating in a distributed environment instantiating M managed characteristic application computer programs managed by the N hosts, resource allocation control software instantiated by at least the N hosts, M and N each being a positive integer, where M may be equal to, less than, or greater than N, the software comprising:

a first function which determines a state and health of the N hosts, a network operatively coupling the N hosts to one another, and the M managed characteristic application computer programs in the distributed environment;

a second function which determines required allocation and reallocation actions needed to maintain a plurality of Quality of Service (QoS) requirements established for the M managed characteristic application computer programs, the QoS requirements dictating parameters regarding service quality of the M managed characteristic application computer programs; and

a third function which generates automatic control signal requests corresponding to the actions dictated by the QoS requirements, such that the managed characteristic application computer programs are moved, shutdown, and started in accordance with satisfaction of the QoS requirements, wherein the second function determines the required allocation and reallocation actions needed to maintain the Quality of Service (QoS) requirements established for the M managed characteristic applications by:

responding to application and host failures by determining if and what recovery actions should be taken;

determining if and where to place new copies of one of the M managed characteristic application computer programs or which of the M managed characteristic application computer programs should be shutdown when QoS Manager functions indicate that scale up or scale down

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actions are indicated based on measured application performance and application QoS specifications;

determining where new application computer programs should be placed when requested to do so by a program control device; and

determining which and how many application computer programs should run based on application system priorities.

17. (Original) The software as recited in claim 16, wherein the first function receives system specification information comprising selected ones of host configuration and capabilities, application capabilities, survivability requirements, scalability characteristics, application startup and shutdown dependencies, and application and path performance requirements.

18. (Previously Presented) The software as recited in claim 16, wherein the first function receives program control information comprising application status and detected application faults for each of the M managed characteristic application computer programs, and detected failures regarding the N hosts.

19. (Previously Presented) The software as recited in claim 16, wherein the first function receives application performance data representing each of the M managed characteristic application computer programs.

20. (Previously Presented) The software as recited in claim 16, wherein the first function receives application performance data on one or more applications instantiated by the N hosts including performance data representing each of the M managed characteristic application computer programs.

21. (Cancelled)

22. (Previously Presented) The software as recited in claim 16, wherein at least one of the M managed characteristic application computer programs comprises a scalable application computer program.

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23. (Previously Presented) The software as recited in claim 16, wherein at least one of the M managed characteristic application computer programs comprises a fault tolerant application computer program, where the degree of fault tolerance is selectable by a user.

24. (Previously Presented) The software as recited in claim 16, wherein one of the M managed characteristic application computer programs comprises a selectable priority application computer program.

25. (Previously Presented) The software as recited in claim 16, wherein the M managed characteristic application computer programs comprise M copies of a single managed characteristic application computer program.

26. (Previously Presented) Software stored on at least one host for converting N networked hosts into a resource managed system instantiating M managed characteristic application computer programs, each managed characteristic application computer program managed by one of the N networked hosts, the software comprising:

- a first function group which monitors the host and network resources;

- a second function group which provides application computer program event reporting and event correlation capabilities;

- a third function group which provides reasoning and decision making capabilities for the resource managed system, wherein the third function group comprises:

- a first function which determines the a state and health of the N hosts, a network operatively coupling the N hosts to one another and the M managed characteristic application computer programs in the distributed environment;

- a second function which determines required allocation and reallocation actions needed to maintain a plurality of Quality of Service (QoS) requirements established for the M managed characteristic application computer programs, the QoS requirements dictating parameters regarding service quality of the M management characteristic application programs;
- and

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a third function which generates automatic control signal requests corresponding to the actions dictated by the QoS requirements, such that the managed characteristic application computer programs are moved, shutdown, and started in accordance with satisfaction of the QoS requirements; and

a fourth function group which provides program control capabilities permitting starting, stopping, and configuring of selected ones of the M managed characteristic application computer programs on respective ones of the N hosts in the resource managed system,

where M and N are positive integers and where M may be equal to, greater than, or less than N.

27. (Previously Presented) The software as recited in claim 26, wherein the first function receives system specification information comprising host configuration and capabilities.

28. (Previously Presented) The software as recited in claim 26, wherein the first function receives system specification information comprising selected ones of capabilities, survivability requirements, scalability characteristics, startup and shutdown dependencies, and performance requirements for at least one of the M managed characteristic application computer programs.

29. (Original) The software as recited in claim 26, wherein the first function receives system specification information comprising path performance requirements regarding communication between at least two of the N hosts.

30. (Previously Presented) The software as recited in claim 26, wherein the first function receives program control information comprising application status and detected application faults for each of the M managed characteristic application computer programs, and detected failures regarding the N hosts.

31. (Original) The software as recited in claim 26, wherein the first function receives historical data regarding statuses, configuration, and loads of the N hosts and link statuses and loads regarding the network.

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32. (Previously Presented) The software as recited in claim 26, wherein the first function receives application performance data representing each one of the M managed characteristic application computer programs.

33. (Previously Presented) The software as recited in claim 26, wherein the first function receives application performance data on one or more applications instantiated by the N hosts including performance data representing each of the N copies of the managed characteristic application computer programs.

34. (Previously Presented) The software as recited in claim 26, wherein the second function which determines the required allocation and reallocation actions established for the M managed characteristic application computer programs by:

- responding to application and host failures by determining if and what recovery actions should be taken;

- determining if and where to place new copies of managed characteristic application computer programs or which managed characteristic application computer programs should be shutdown when QoS Manager functions indicate that scale up or scale down actions should be taken based on measured application performance and QoS specifications established for the M managed characteristic application computer programs;

- determining where new application computer programs should be placed when requested to do so by the fourth function group; and

- determining which and how many application computer programs should run based on application system priorities.

35. (Previously Presented) The software as recited in claim 26, wherein the third function group makes decisions by one of:

- based on requests from one or more of the hosts, determining where new application computer programs should be started;

- based on indication of application failure from the fourth function group, determining whether and where the a failed application computer program should be restarted;

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based on indication of host failure from the fourth function group, determining whether and where the failed application computer program previously instantiated by the failed one of the N hosts should be restarted;

based on startup and shutdown dependency resolution requests from the fourth function group, determine whether and where additional application computer programs should be one of started and shut down prior to starting or shutting down another application computer program; and

based on changes to application system priorities, determining whether and where new application computer programs need to be started and/or determine whether and which existing application computer programs need to be shutdown.

36. (Previously Presented) The software as recited in claim 26, wherein the third function group makes decisions by one of:

based on application computer program inter-dependencies defined in system specification files, determining whether and where additional application computer programs should be one of started and shut down prior to starting or shutting down of another application computer program;

based on application computer program instrumentation data generated by the second function group and performance requirements defined in the system specification files, determining whether application computer programs are meeting performance requirements and whether an application computer program can be scaled up or moved to attempt to improve performance; and

based on the application computer program instrumentation data and performance requirements defined in the system specification files, determining whether application computer programs are performing well within performance requirements and can be scaled down.